

## Special Issue Fire Safety Journal on Car Park Fire Safety – Preface

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In densely populated regions, underground car parks are increasingly popular. They range from relatively small car parks underneath residential dwellings to huge public car parks underneath e.g. shopping malls, airports, offices, etc. On the other hand, to a large extent the actual design methodology with respect to fire and explosion safety still relies on semi-empirical approaches. As a consequence, the current designs may be sub-optimal with respect to global safety. This inspired the Flemish government in Belgium to fund a large-scale research project on car park fire and explosion safety [1]. Using the results of this project as starting point, the Special Issue at hand has the ambition to present worldwide state-of-the-art scientific research findings for a number of different aspects concerning fire and explosion safety.

With respect to smoke and heat control (SHC) in large car parks, the focus is first on design fires and global findings on SHC design. Other contributions report on extensive full-scale experimental and numerical CFD (Computational Fluid Dynamics) simulations campaigns. In addition hereto, the potential use of different types of video data in the context of developing fires is examined. Moreover, it is illustrated that the use of reduced-scale models can prove extremely useful.

With respect to explosion safety, an extensive quantitative risk assessment analysis is presented, with particular attention for possible risks associated with LPG-fuelled cars. The effect of blast loads on concrete slabs, when an explosion occurs, is examined in the light of residual structural stability of a car park. The possible impact of a fire, preceding the explosion, is also discussed.

With respect to the structural stability, the impact of a fire (without explosion) is described in a quantitative manner, with special attention devoted to the punching shear stress at the junction of columns and concrete slabs in the ceiling structure. Not only a single isolated slab, but also an entire car park structure is to be taken into account.

Not all possible car park fire and explosion safety aspects are covered in this Special Issue. Detection, suppression, human behaviour, fire service intervention and operational issues of fire safety systems are examples of topics that, though all interesting, are not addressed.

It is our hope that the Special Issue at hand can serve as reference for the state-of-the-art, and as source of inspiration for future research on fire and explosion safety in car parks around the globe.

[1] B. Merci, L. Taerwe, P. Vandevelde, E. Van den Bulck, F. Van den Schoor, J. van Beeck and J. Vantomme, *Fundamental design approaches for improvement of the fire safety in car parks*, IWT SBO project 080010 (Flanders, Belgium).